

## REMARKS

### Introductory Comments:

Claims 1-18 were examined in the Office Action dated April 8, 2004.

Claims 1-4 and 6-8 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,973,444 to Xu *et al.*

Claims 5 and 9-18 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Xu *et al.* in view of U.S. Patent No. 6,413,487 to Resasco *et al.*

These rejections are traversed for the reasons discussed below.

Claims 1-18 are presently pending.

## SUPPORT FOR AMENDMENTS TO THE CLAIMS

Claims 1, 9, and 13 have been amended so that the gas pressure is about 400 torr to about 600 torr. Support for the amendment can be found, for example, at page 6, paragraph 30, of the application as originally filed. The amendments to the claims therefore add no new matter.

### **Addressing the Examiner's Rejections**

#### **Rejections of the Claims Under 35 U.S.C. §103**

(A) The Examiner has rejected claims 1-4 and 6-8 under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,973,444 to Xu *et al.*

The applicants traverse the rejection. Xu *et al.* discloses carbon fiber-based field emission devices, where carbon fiber emitters are grown and retained on a catalytic metal

film as part of the device. Xu et al. disclose that the fibers forming part of the device may be grown in the presence of a magnetic or electric field, as the fields assist in growing straighter fibers. In particular, Xu *et al.* does not teach or suggest conducting the reaction at a pressure of about 400 torr to about 600 torr as in the Applicants' processes.

In the previous reply, the applicants had stated that Xu *et al.* teach the use of extremely low pressures at column 15, lines 5-15. The Examiner stated that the low pressure is to a method of emitting electrons and not to the growth of carbon fibers. The applicants agree with the Examiner.

Xu *et al.* disclose two different methods for the growth of carbon fibers. In one method, the carbon is not externally supplied, but is rather produced from the decomposition of the catalyst compound and the residual solvents. In the other method, the catalyst is heated in the presence of a carbon source to form the carbon fibers. At column 8, lines 61-63, the reference states that the carbon source can be from one millitorr to several atmospheres. However, the pressure at which the carbon fibers are grown need not correspond to the pressure of the carbon source. In fact, the carbon fibers are fabricated under very low pressure in Examples 1 and 4. At column 19, lines 62-65, (Example 1), the substrate is heated at various temperatures and pressures, and for various periods of time. The range of pressures employed is 0.1-1 torr of acetylene – this pressure is significantly lower than the pressure of about 400 torr to about 600 torr as presently claimed by the applicants. Further, at column 21, lines 64-65 (Example 4) Xu *et al.* states that “the wafer was heated in 200 millitorr of acetylene at 650° C for about one minute.” Thus, even though the pressure of the carbon source can cover a large range of pressure, it can be reasonably concluded that the growth of the carbon fibers is carried out at low pressures.

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The reference does not teach or suggest the use of pressure in the particular range of about 400 torr to about 600 torr. The reference thus does not teach or suggest all the limitations of the applicants' claims. The Examiner is therefore respectfully requested to withdraw the rejection.

(B) The Examiner has rejected claims 5 and 9-18 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Xu *et al.* in view of U.S. Patent No. 6,413,487 to Resasco *et al.*

The applicants traverse the rejection and supporting remarks as the references cited by the Office do not teach or suggest the claimed invention. The combination of Xu *et al.* and Resasco *et al.* does not teach or suggest conducting the reaction at a pressure of 400 torr to about 600 torr as in the Applicants' processes.

Claim 5 is a dependent claim, and therefore contains all the limitations of the claim's from which it depends. Claim 5 ultimately depends from claim 1 that has been amended to recite a gas pressure of about 400 torr to about 600 torr. Xu *et al.* and Resasco *et al.*, when combined, do not teach a gas pressure of about 400 torr to about 600 torr. In fact, Resasco *et al.* teach or suggest a method of preparing carbon nanotubes under high or elevated reaction pressures that range from about 1 atmosphere to about 40 atmospheres (column 4, lines 11-15). Thus, the combination of the cited references do not disclose all the elements of the claims. The Examiner is therefore respectfully requested to withdraw the rejection.

The independent claims 9 and 13 have been amended to recite a gas pressure of about 400 torr to about 600 torr. Thus, the independent claims, and all the claims that depend from them contain this limitation. The combination of Xu *et al.* and Resasco *et*

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*al.* does not result in a process where the methane gas composition is decomposed at a gas pressure of about 400 torr to about 600 torr. Thus, the combination of references does not disclose all the elements of the claims. The Examiner is therefore respectfully requested to withdraw the rejection.

### CONCLUSION

Applicants respectfully submit that the claims define an invention that is patentable over the art. Accordingly, a Notice of Allowance is believed in order and is respectfully requested.

If the Examiner notes any further matters which the Examiner believes may be expedited by a telephone interview, the Examiner is requested to contact the undersigned.

Respectfully submitted,  
Grigorian *et al.*

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